Attachment A

25X1

# RECORD OF INVENTION

SUBMIT IN TRIPLICATE TO CHAIRMAN, CIA PATENTS BOARD

1. DATE: 14 December 1964

2. NAME OF INVENTOR: 25X1

3. POSITION TITLE AND GRADE OR RANK: Technologist (Photo);GS09; Deputy Br.Ch.GS-14

4. OFFICE: NPIC

5. DIVISION: P&DS

6. BRANCH: Development

7. LEGAL RESIDENCE: 518 E Street, S.E. Wash.,DC; 25X1

8. HOME ADDRESS: SAME SAME

9. TITLE OF INVENTION: Automatically-Masked Vacuum Platen

10. BRIEF DESCRIPTION OF INVENTION:

See attached sheets

11. DEVELOPMENT AND DISCLOSURE DATA

| | DATE | PLACE |
|---|---|---|
| A. CONCEPTION BY INVENTOR | 27 October 1964 | DB/P&DS/NPIC |
| B. DISCLOSURE TO OTHERS | " " " | " |
| C. FIRST SKETCH OF DRAWING | 4 November 1964 | " |
| D. FIRST WRITTEN DESCRIPTION | " " " | " |
| E. COMPLETION OF MODEL OR FULL-SIZED DEVICE | 3 November 1964 | " |
| F. FIRST TEST OF OPERATION OF INVENTION | " " " | " |

25X1

12. HAS INVENTION BEEN REDUCED TO PRACTICE? YES [ ] NO [X]

13. NAMES OF PERSONS HAVING KNOWLEDGE OF FACTS STATED UNDER 11.B.

14. STATE TO WHAT EXTENT THE CONCEPTION OF THE INVENTION IS BASED ON INFORMATION OBTAINED FROM YOUR OFFICIAL DUTIES, AND, TO WHAT EXTENT GOVERNMENT TIME, MATERIALS, FACILITIES, EQUIPMENT, ETC. WERE UTILIZED IN MAKING INVENTION.

See attached sheets

Declass Review by NIMA/DOD

15. ASSIGNMENTS, IF ANY

25X1 Royalty free assignment to U.S. Government

WITNESS 17. INVENTOR

10. Brief Description of Invention

This invention consists of a system of manifolds and valves coupled to a porous platen in such a way that a vacuum applied to a manifold on one side of the valves will be automatically masked or cut-off by these valves except in those areas where a relatively non-porous material has been placed on the opposite side of the platen. In that case, the covered valves automatically open and allow the vacuum to be applied to the substance placed on the platen. By this means a vacuum platen of relatively large area can be automatically masked so that it will effectively exert the system's full capacity on flat materials placed on the platen even though a relatively small portion of the platen is covered by the material.

This automatic masking is accomplished in the following manner:

(1) The platen is honey-combed with individual identical cells.

(2) In the accompanying drawing these cells are joined at the bottom to a manifold, A, to which a vacuum pump is attached.

(3) Each cell consists of an automatic control or governor valve (in the drawing illustrated by a flat spring or reed valve, B) pierced by a small by-pass port, b, and leading into individual small manifolds, C.

(4) These manifolds are covered by a flat porous platen, D. (Closely spaced, small holes would also be satisfactory.) The porosity of the platen is such that it will support relatively flimsy material without deformation. Yet, when uncovered, it will allow adequate flow of air causing the control valve to close, and thus reducing the flow to that allowed by the by-pass port.

(5) In the instance that a relatively non-porous substance, E, is placed on the platen, the flow of air is restricted and the leakage of the by-pass port allows the pressure in the upper and lower manifolds to equalize.

This will, in turn, cause the control valve to open, thereby allowing a greatly increased flow to pull and hold the substance down on the platen.

This automatically masked vacuum platen should have extensive application in a number of situations whenever it is necessary to hold flat-sided objects in place with forces not exceeding that of atmospheric pressure. Also, the objects may vary in size and shape with respect to the platen on which they are held in place. Some examples of these applications are:

(1) Photographic cameras, enlargers, copy boards, printers, etc.

(2) Coordinatographs, automatic point and line plotters, stereo plotters, drafting boards.

(3) Model shops for holding work on shaping tables, drill presses, etc.

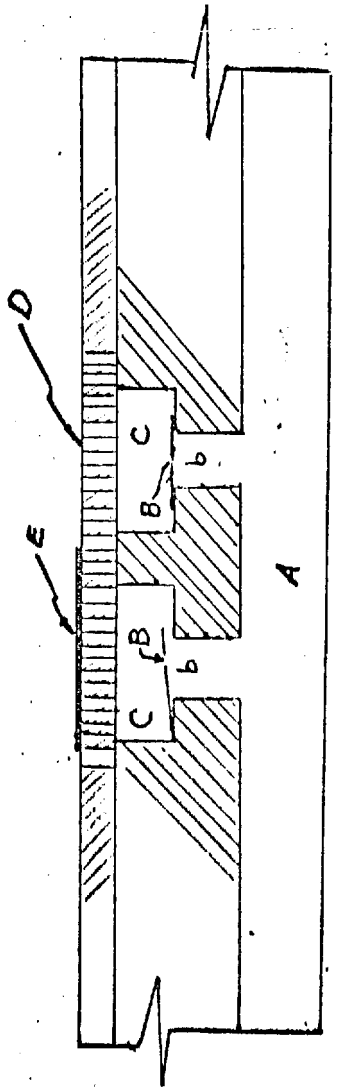
(4) Optical shops for handling glass prisms and plates, etc.

25X1 14. [redacted] are responsible for initiating and monitoring development contracts with private industry. Whereas they are expected to contribute to such development, evolution of a complete, specific invention such as this is not among their assigned responsibilities.

This invention was conceived in response to a problem which occurred during [redacted] assignment for monitoring the development 25X1 25X1 of a vacuum easel for the [redacted] VG-1 Enlarger.

In the course of this assignment, [redacted] discerned that 25X1 the contractor was not progressing toward a solution to the problem of holding different sizes and weights of photo materials flat on the easel. As a result of this discernment, he discussed the problem with his 25X1 supervisor, [redacted] During this discussion the idea for the Automatically-Masked Vacuum Platen was conceived. Subsequent component research and discussion was utilized to formulate the specific invention described herein.

AUTOMATICALLY-MASKED VACUUM PLATEN FOR RECORD OF INVENTION DATED 14 DECEMBER 1962



SECRET
(When Filled In)

Attachment B

# R & D CATALOG FORM

DATE: 1 March 1965

1. PROJECT TITLE/CODE NAME: VG-1 Vacuum Easel Development

2. SHORT PROJECT DESCRIPTION: Development of a vacuum easel for the [redacted] VG-1 Enlarger. 25X1

3. CONTRACTOR NAME:

4. LOCATION OF CONTRACTOR:

5. CLASS OF CONTRACTOR: Manufacturer

6. TYPE OF CONTRACT: CPFF

7. FUNDS:
FY 19 $
25X1 FY 1965 [redacted]
FY 19 $

8. REQUISITION NO.: NA

9. BUDGET PROJECT NO.: NP-R-3

10. EFFECTIVE CONTRACT DATE (Begin - end): March 1965 - June 1965

11. SECURITY CLASS.:
A. A. - Confidential
T. - Unclassified
W. - Unclassified

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION

25X1 DDI/NPIC/P&DS [redacted]

13. REQUIREMENT/AUTHORITY

25X1 This development will permit the use of printing paper, with its inherent edge-curl problems, on the [redacted] VG-1 Enlarger without the necessity for weights, masks, etc., to secure the paper. The requirement for the project was (Contd)

14. TYPE OF WORK TO BE DONE

Engineering Development

15. CATEGORIES OF EFFORT

| MAJOR CATEGORY | SUB-CATEGORIES |
|---|---|
| Reproduction and Processing Equipment (Equipment Modification) | Interpretation/Analysis |

16. END ITEM OR SERVICES FROM THIS CONTRACT/IMPROVEMENT OVER CURRENT SYSTEM, EQUIPMENT, ETC.

The contract will result in one prototype easel to be installed on existing equipment. The improved easel will enable the operator to place photographic printing paper on any area of the vacuum easel and the paper will be automatically held flat.

17. SUPPORTING OR RELATED CONTRACTS (Agency & Other)/COORDINATION

From contacts throughout industry and the intelligence community, it has been determined that no other development of this type is presently underway.

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT (Continue on additional page if required) The present VG-1 easel requires the use of weights to flatten and hold printing paper during the exposure cycle. The consequent procedure is very time-consuming and ineffectual, particularly when over-sized paper is utilized. The development of the vacuum easel for the VG-1 will eliminate this problem.

NPIC proposes to investigate, design and fabricate a vacuum easel employing the principles described in an attached document entitled "Brief Description of 25X1 Invention" by Messrs. [redacted] of the DB/PDS. It is evident from the description that the principles have not been developed to (Contd)

19. APPROVED BY AND DATE

| OFFICE | DEPUTY DIRECTOR | DDCI |
|---|---|---|
| | | |

R & D CATALOG FORM (continued)

13. levied by NPIC/PDS.

18. full potential. Although a crude and workable easel could easily be built from the invention description as it now stands, it is more important to detail the application by establishing the best method of implementation. The best method will only result from a thorough analysis of the pneumatic principles involved and should result in a unique and vastly superior vacuum easel.

Specific objectives to be accomplished under this development are as follows: the vacuum easel shall

A. hold flat all conventional weights of printing paper.
B. permit easy positioning of the printing paper on the format.
C. provide rapid vacuum "take down".
D. permit rapid vacuum release.
E. permit rapid hold-down without creating "dimples" or other blemishes on the paper.
F. place material in the same focal plane as the present easel's.
G. hold down all sizes of printing paper without regard to position on the easel format and without the use of masks etc.

A Development Objective was written for this project and proposals were solicited from three local companies. Only local companies were invited because it was necessary to brief each company on the new techniques after having them sign patent disclosure papers. Two of the three companies -- [redacted] 25X1
25X1 submitted proposals. [redacted] proposal was considered to be technically
25X1 far superior to [redacted] however, there was a considerable
difference in price: [redacted] for the 25X1
25X1 [redacted] proposal. After considerable weighing of technical and monetary considerations, it was decided that we are obliged to select
25X1 the [redacted] proposal for the following reasons:

1. This easel incorporates a new and unique vacuum hold-down technique which promises a break-through in vacuum platen technology; however, it has never been implemented before and the techniques of fabrication and the exact pneumatic principles involved are not known in detail. A comprehensive theoretical investigation of these problem areas by competent engineers will be required prior to an attempt to
25X1 implement this system: [redacted] has the necessary engineering staff,
25X1 and [redacted] does not.

R & D CATALOG FORM (continued)

18.

25X1 2. [redacted] proposal indicates a fundamental understanding of the problem areas involved while the [redacted] proposal indicates they have not examined the situation in depth. [redacted] does not appear to really comprehend the magnitude of the design problem, for their proposal calls for only 14 hours of engineering time and 40 hours of design time compared to Librascope's proposal which designates 180 hours of engineering plus 160 hours of design time. 25X1 25X1

25X1 3. [redacted] proposal elucidates some superior design and fabrication features: e.g., they plan to use a special casting to provide internal support to the vacuum surface thereby increasing rigidity and assuring optical flatness of the printing surface. To the contrary, 25X1 [redacted] proposes to use sheet metal construction: optical considerations should obviate this approach.

25X1 4. In 1963 the [redacted] attempted to produce a vacuum easel for this same enlarger and was totally unsuccessful, resulting in 25X1 a loss to the agency of over [redacted] They were invited to propose again only because it was feared that few local companies would be interested in a contract for such a small modification and that we might have to consider them as a last resort.

25X1 5. It is our opinion that [redacted] has vastly underbid the contract and is incapable of producing the device we want.

25X1 Because [redacted] has far superior engineering capabilities, a highly competent technical staff, and offers the best technical approach in their proposal, they were selected as the potential contractor.

Although the proper security measures are not in effect at the contractor's plant, the necessary company officers have Agency secret clearances.

# BRIEF DESCRIPTION OF INVENTION

By:

25X1

[redacted]

This invention consists of a system of manifolds and valves coupled to a porous platen in such a way that a vacuum applied to a manifold on one side of the valves will be automatically masked or cut-off by these valves except in those areas where a relatively non-porous material has been placed on the opposite side of the platen. In that case, the covered valves automatically open and allow the vacuum to be applied to the substance placed on the platen. By this means a vacuum platen of relatively large area can be automatically masked so that it will effectively exert the system's full capacity on flat materials placed on the platen even though a relatively small portion of the platen is covered by the material.

This automatic masking is accomplished in the following manner:

(1) The platen is honey-combed with individual identical cells.

(2) In the accompanying drawing these cells are joined at the bottom to a manifold (A), to which a vacuum pump is attached.

(3) Each cell consists of an automatic control or governor value (in the drawing illustrated by a flat spring or reed valve, (B) pierced by a small by-pass port, b, and leading into individual small manifolds, (C).

(4) Those manifolds are covered by a flat porous platen, (D). (Closely spaced, small holes would also be satisfactory.) The porosity of the platen is such that it will support relatively flimsy material without deformation. Yet, when uncovered, it will allow adequate flow of air causing the control valve to close, and thus reducing the flow to that allowed by the by-pass port.

(5) In the instance that a relatively non-porous substance, (E), is placed on the platen, the flow of air is restricted and the leakage of the by-pass port allows the pressure in the upper and lower manifolds to equalize.

This will, in turn, cause the control valve to open, thereby allowing a greatly increased flow to pull and hold the substance down on the platen.

This automatically masked vacuum platen should have extensive application in a number of situations whenever it is necessary to hold flat-sided objects in place with forces not exceeding that of atmospheric pressure. Also, the objects may vary in size and shape with respect to the platen on which they are held in place. Some examples of these applications are:

(1) Photographic cameras, enlargers, copy boards, printers, etc.

(2) Coordinatographs, automatic point and line plotters, stereo plotters, drafting boards.

(3) Model shops for holding work on shaping tables, drill presses, etc.

(4) Optical shops for handling glass prisms and plates, etc.

This invention was conceived in the course of official duties. An assignment had been given to [redacted] to define objectives for the development of a vacuum easel needed for photo-enlargers. [redacted] was to initiate and monitor this development through a contract with industry.

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25X1

In the course of this development contract [redacted] discussed with [redacted] the problem of holding down miscellaneous sizes of double-weight print paper. In the course of this discussion the idea for the Automatically-Masked Vacuum Platen was conceived. Subsequent component research and discussion refined the idea into the invention described herein.

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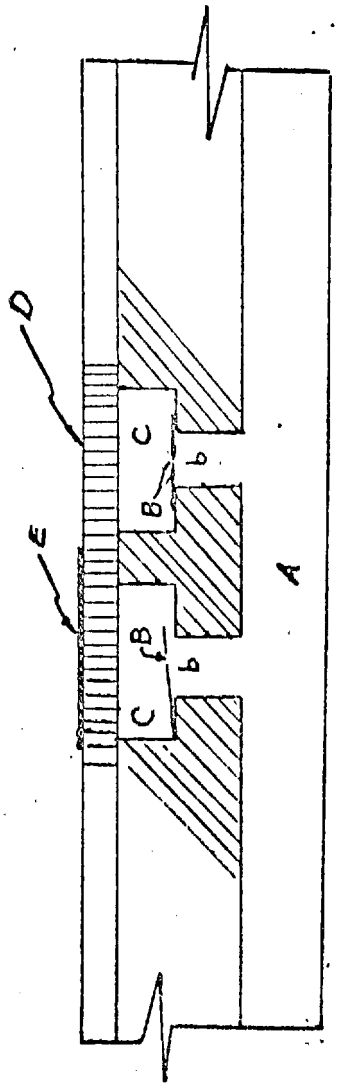
25X1

[redacted] are responsible for initiating and monitoring development contracts with private industry. Whereas they are expected to contribute to such development, evaluation of a complete, specific invention such as this is not among their assigned responsibilities.

AUTOMATICALLY-MASKED VACUUM PLATEN FOR RECORD OF INVENTION DATED 14 DECEMBER 1962



Attachment C

12 January 1965

25X1

MEMORANDUM FOR: [redacted]

SUBJECT : Determination of Government Interest re Automatically - Masked Vacuum Platen

1. Title 37, Chapter III, Section 300.6 covering regulations concerning inventions made by government employees states that the following rules shall be applied in determining the respective rights of the Government and of the inventor in and to any invention:

(1) The Government shall obtain the entire domestic right, title and interest in and to any invention made by a Government employee (i) during working hours, or (ii) with a contribution by the Government of facilities, equipment, materials, funds or information, or of time or services of other Government employees on official duty, or (iii) which bears a direct relation to or is made in consequence of the official duties of the inventor.

(3) In applying the provisions of sub-paragraphs (1) to the facts and circumstances relating to the making of a particular invention, it shall be presumed that an invention made by an employee who is employed or assigned (i) to invent or improve or perfect any art, machine, design, manufacture, or composition of matter, (ii) to conduct or perform research, development work, or both (iii) to supervise, direct, coordinate, or review Government financed or conducted research, development work, or both or (iv) to act in liaison capacity among governmental or non-governmental agencies or individuals engaged in such research or developmental work, falls within provisions of sub-paragraph one (1).

2. Applying the above regulations to the statement submitted under section 14 of the Record of Invention, a ruling must be made that the Government has the entire domestic right, title and interest to this invention. The ruling is based on the fact that the invention was conceived in the course of official duties and that the assignments of inventors fall under sub-paragraph (3) (ii) and (iii).

25X1

Memorandum for [redacted] dated 12 January 1965
SUBJECT: Determination of Government Interest re Automatically - Masked Vacuum Platen

3. In order that the Government and the inventors be fully protected, this invention should either be submitted for patenting or made public by disclosure in a technical journal.

4. There is no established Agency procedure to implement the above recommendation. It is suggested however, that a memorandum be prepared requesting that the Agency apply for a patent on this invention. The memorandum should state that the invention is being used by this Agency or other government agencies or that a definite need exists for such a device, or that there is sufficient commercial interest in the device to warrant the Government patenting it. The memorandum should be sent to the Chairman of the CIA Patents Board and be signed by the Director of NPIC or one of his designated deputies.

5. If you have any further questions relative to this matter, I shall be glad to answer them.

[redacted] 25X1

Chairman
CIA Patents Board

Distribution:
Original & 2 - Addressee

Attachment D

MPIC/D-31-65
10 March 1965

MEMORANDUM FOR: Chairman, CIA Patents Board

SUBJECT: Government Interest re: Patent of Automatically-Masked Vacuum Platen

REFERENCES:
(a) Record of Invention titled "Automatically-Masked Vacuum Platen," dated 14 December 1964

(b) Memorandum from Chairman, CIA Patents Board; Subject: Determination of Government Interest re: "Automatically-Masked Vacuum Platen," dated 12 January 1965

1. In accordance with established procedures, Messrs. [redacted] prepared reference (a) and forwarded the same to your office. 25X1

2. In response to this submission, reference (b) described certain regulations pertinent to the request for royalty-free assignment to the United States Government and disclosed that patent applications cannot be pursued without endorsement from higher authority.

3. Upon review of reference (b) in regard to the request for royalty-free assignment to the United States, it appears that the quoted regulations indicate that the Government has the prerogative to the entire domestic rights, title, and interest for an invention conceived under the circumstances cited in reference (a). I understand, however, that the possibility exists for the Government to yield domestic commercial rights for the patent to the inventors as long as all Government purchases of devices employing the invention are royalty-free.

4. This Center uses many different types of equipment which are fitted with vacuum [illegible] vessels. A persistent complication with these devices has been the proper masking of the vessel to prevent vacuum leakage when materials of

SUBJECT: Government Interest re: Patent of Automatically-Masked Vacuum Platen

various sizes which do not fully cover the platen are to be held down (by the vacuum). Most systems are sectioned into compartments which can be controlled by manually operated valves to achieve a certain level of accommodation; but this technique is generally quite modular and therefore not very versatile. Moreover, considerable time is required to properly set the valves for a given masking situation. A less sophisticated technique utilizes mechanical masks which cover the entire platen and which have varying apertures cut to fit the most frequently used paper sizes. Neither of these techniques is efficient in terms of time, and both have frustrating operational characteristics.

5. Evaluation of the Automatically-Masked Vacuum Platen proposed by [redacted] indicates that significant savings in operational time and duress can be achieved. The scheme which they have devised and its proposed implementation have been reviewed by technically competent engineers and scientists of both the Plans and Development Staff and industry: no one has taken exception to this feasibility. To further support the theory, the inventors constructed an operational brendboard with which the automatic masking action is readily demonstrated.

25X1

6. As a consequence of the inherent simplicity of this system, it appears that the manufacture of these platens will be relatively inexpensive. For this reason and because there are broad areas for potential application in this Center and throughout the Government and industry, I feel that patent application is thoroughly justified; and I request that appropriate action be initiated by the Patents Board.

7. Further, I request that all commercial rights (with the exception of the royalty-free assignment to the United States Government) be reserved for the inventors. I understand that this practice is being broadly utilized by Government agencies having responsibility in research and development as a means for attracting, stimulating and retaining highly qualified technical personnel. The mission of this Center -- and the Plans and Development Staff in particular --

SUBJECT: Government Interest re: Patent of Automatically-Masked Vacuum Platen

demands that every such available means be employed to assure maximum effectiveness in our research and development effort and consequent leadership in the field.

[redacted] 25X1

ARTHUR C. LUNDAHL
Director
National Photographic Interpretation Center

Distribution:
Orig & 1 - Addressee
1 - P&DS/NPIC
1 - MSS
2 - ODir/NPIC

25X1 [redacted] 10 March 1965

SECRET

Attachment E

12 July 1965

MEMORANDUM FOR: [redacted] 25X1

FROM : Chairman, CIA Patent Board

SUBJECT : Determination of Government Interest re Automatically-Masked Vacuum Platen

REFERENCES : (a) Memorandum from Chairman, CIA Patent Board, dated 12 January 1965; Subject: Determination of Government Interest re "Automatically-Masked Vacuum Platen."

(b) Memorandum from Director, NPIC, dated 10 March 1965; Subject: Automatically-Masked Vacuum Platen.

1. The entire CIA Patents Board has reviewed the Record of Invention, entitled, "Automatically-Masked Vacuum Platen."

2. The Board ruled that the Government be granted the entire right, title, and interest in this invention. The ruling is based on the inventors research and development assignments and that all time, material, equipment and facilities were government furnished. This ruling is based on Title 37, Chapter III, Section 300.6 covering regulations concerning inventions made by Government employees as set forth in reference (a).

3. If you do not concur with the Board's ruling you have the right to obtain a review of the Board's determination by filing, within 30 days after receipt of this notice of determination, an appeal with the sub-





SECRET

mission of additional evidence to rebut the facts upon which the Board based its ruling.

4. This Record of Invention has been forwarded to the Army JAG Office, Patents Division for a preliminary patent search and the preparation of an application.

5. In reference to paragraph 7 of reference (b), the Board recognizes that the patent practices and policies of Government agencies, in granting commercial rights for inventions to their employees, vary. The Patent Advisory Panel of the Federal Council for Science and Technology is currently attempting to establish a uniform policy for all Government agencies. [redacted] 25X1 Assistant General Counsel is the CIA representative on that Board. Until such regulations are established, this Agency follows procedures as set forth under the Armed Services Procurement Regulation (ASPR) and Title 37, Chapter III (copy attached).

6. If there are any further questions relative to this matter, or if I can provide any additional assistance, I shall be glad to do so.

[redacted] 25X1
Chairman, CIA Patents Board

Attachment:
Regulation

Distribution:
Orig&2 - Addressee w/att.

Attachment F

19 July 1966

25X1 MEMORANDUM FOR: [redacted]

SUBJECT : Automatically-Masked Vacuum Platen

1. The results of a preliminary patent search by the Office of the Judge Advocate General is attached. They state that the Anander patent (attached) anticipates your disclosure and do not recommend further processing. Please review their findings and if you do not concur, contact me
25X1 on extension [redacted]

2. Your review is requested because it is possible that the searcher may have misinterpreted the disclosure and found a patent bearing on it.

[redacted] 25X1

Chairman, CIA Patents Board

Attachments:
Results of preliminary patent search
Anander patent

DEPARTMENT OF THE ARMY
OFFICE OF THE JUDGE ADVOCATE GENERAL
WASHINGTON, D.C. 20310

JAGP

29 JUN 1966

25X1 [redacted]
Assistant General Counsel
Central Intelligence Agency
Washington, D. C. 20505

25X1 Re: Invention Disclosure of [redacted] 25X1
[redacted] for "Automatically-Masked Vacuum Platen"

25X1 Dear [redacted]

As requested, a search of the records in the U. S. Patent Office has been made on the above-referenced disclosure.

The disclosed apparatus involves a system of manifolds and valves coupled to a porous platen in such a way that a vacuum applied to a manifold on one side of the valves will be automatically masked or cut-off by these valves except in those areas where a relatively non-porous material has been placed on the opposite side of the platen. The covered valves automatically open and allow the vacuum to be applied to the substance placed on the platen. By this means a vacuum platen of relatively large area can be automatically masked so that it will effectively exert the systems full capacity on flat materials placed on the platen even though a relatively small portion of the platen is covered by the material.

A search in the records of the U. S. Patent Office was conducted in Class 108, subclass 50 and Class 248, subclass 363 and the following patent was found:

| Patent No. | Inventor | Date Issued | Class/subclass |
|---|---|---|---|
| 2,753,181 | A. K. Anander | 3 Jul 1956 | 248 363 |

The disclosure is anticipated by the patent to Anander. Preparation of a patent application is not recommended.

Sincerely yours,

25X1 [redacted]

Acting Chief, Patents Division

2 Incl
1. Disclosure
2. Cy patent listed

July 3, 1956 A. K. ANANDER 2,753,181

FEED MECHANISM FOR WEB MATERIAL

Filed May 14, 1953

Fig. 1

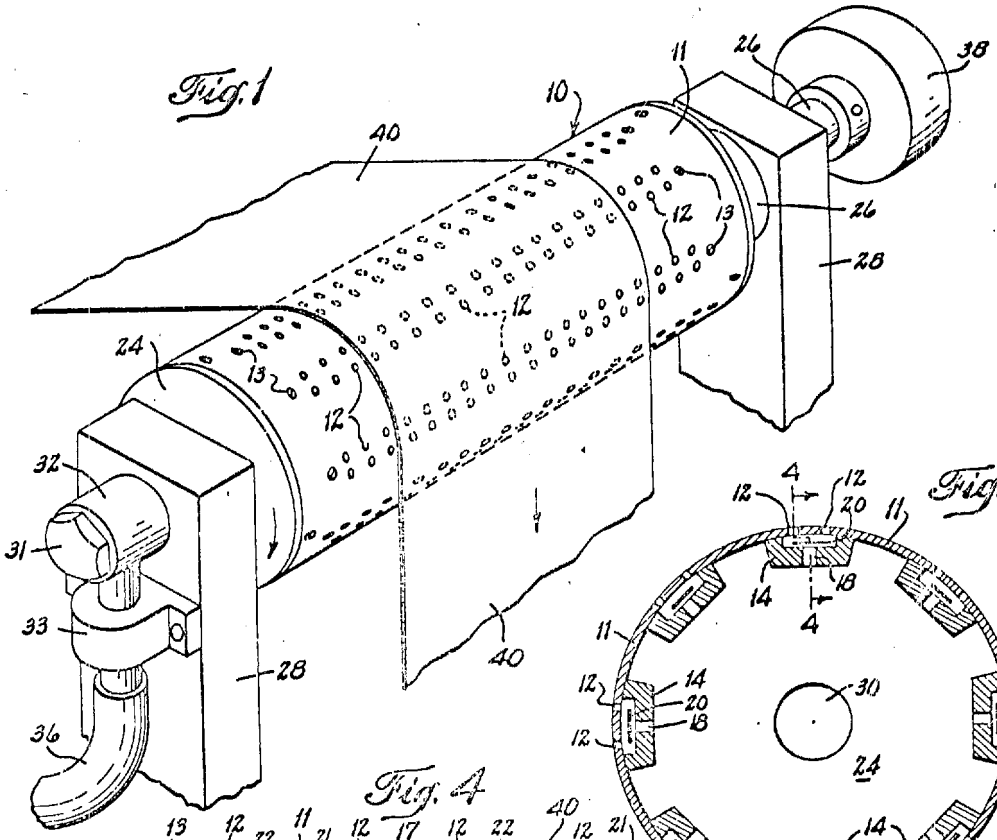



Fig. 3

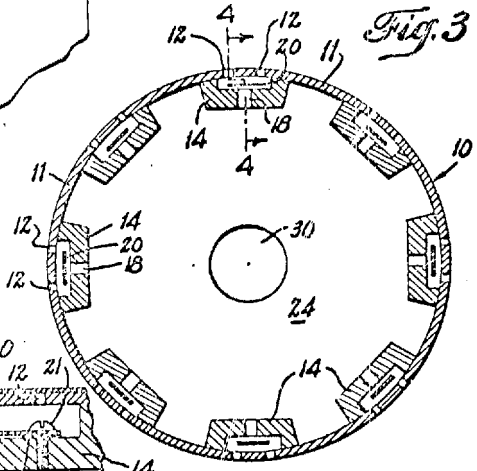



Fig. 4

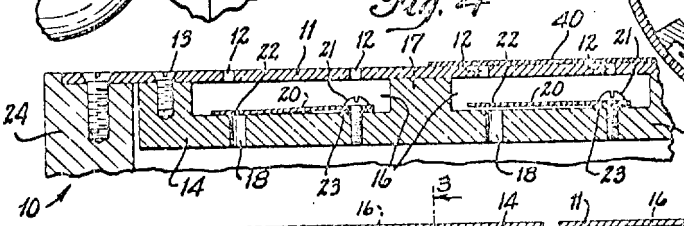



Fig. 2

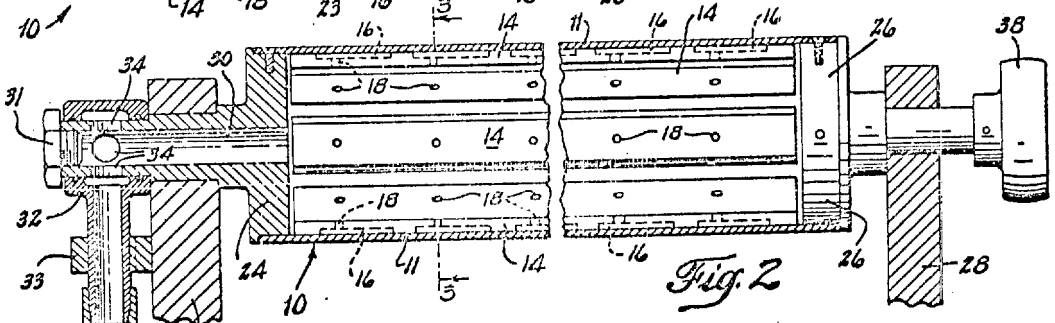
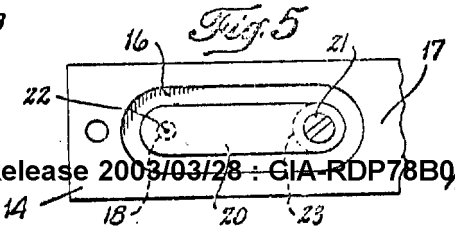



Fig. 5




INVENTOR.
ANDREW K. ANANDER
BY
ATTORNEYS.

United States Patent Office

2,753,181

Patented July 3, 1956



2,753,181

# FEED MECHANISM FOR WEB MATERIAL

Andrew K. Anander, Glen Cove, N. Y., assignor to Powers Chemco, Inc., Glen Cove, N. Y., a corporation of New York

Application May 14, 1953, Serial No. 355,103

3 Claims. (Cl. 271—2.3)

The present invention relates to a novel and improved web feeding mechanism for feeding web material such as paper to be coated or for feeding photographic film or other web material while coating the same.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

In the drawings:

Figure 1 is a perspective view of a typical and preferred embodiment of the invention as adapted for use in a web feeding mechanism showing web material in place on a feeding roll;

Figure 2 is a longitudinal sectional view of the mechanism shown in Figure 1 with the web material removed;

Figure 3 is a cross section through the feeding roll taken on the line 3—3 of Figure 2;

Figure 4 is an enlarged detail section taken on the line 4—4 of Figure 3; and

Figure 5 is an enlarged fragmentary detail of the leaf spring valve and its holder.

The present invention relates to web feeding mechanism, such as feed rolls over which the web of paper, photographic film or other substantially non-porous material may be forwarded and in which the nature of the material or the operations to be performed thereon require that the material be supported on only one side or where the use of vacuum or suction grippers are required or preferred as in the coating of paper or photographic film.

The present invention has for its object the provision of web feeding mechanism which can be used indiscriminately with webs of various widths or thickness and which will hold the web against the feeding mechanism with the output of a small capacity suction pump. A further object is the provision of a suction operated feed mechanism having a plurality of suction apertures and in which the air flow through any apertures not covered by the web is substantially reduced so as to maintain substantially full suction on the web through other apertures. Still another object is the provision in a feed mechanism, such as a feed roll, having a plurality of suction apertures, only a portion of which are covered by the web at any particular time, of means for reducing the wasted suction at the uncovered apertures. This invention thus provides a feeding mechanism for web material of varying widths in the coating process insuring [illegible] frictional con-



In accordance with the present invention the feed mechanism is provided with a foraminated face to the back of which suction is applied to hold the web firmly against the foraminated face and by the pressure differential create sufficient friction between the web and the face to carry the web along with the feeding mechanism and at the same time hold the web firm and flat against the face of the feeding mechanism to facilitate any coating process. The foraminated face is subdivided into a plurality of sections, each of which may be less than about 5% of the total area of the face and may include several suction apertures, and these several areas are connected to a suction pump through valves resiliently urged to an open position but which are moved to a restrictive position by the effect of air passing therethrough due to the absence of material overlying the section of the face and blocking the apertures. In those sections of the face which are covered by the web being fed so as to block the apertures and prevent the flow of air through the apertures the valves are urged to fully open position so that the full suction is applied to the back of the web, while in those sections which are not completely covered by the web the restrictive valves are moved by the effects of the suction to restrictive position; thereby conserving the capacity of the suction pump and insuring that the full area of the web in contact with the feed mechanism is securely and firmly held against the face of the feed mechanism.

As embodied, each section is provided with a restrictive valve comprising a resiliently opened member provided with means for passing a small amount of air through it and overlying a relatively large aperture in the valve body through which air is removed by the suction pump. The restrictive valve in each section communicates with a plurality of small apertures on the foraminated face of the feed mechanisms and controls and is controlled by the air flowing through the small apertures as it is led to the suction pump through the large aperture underlying the restrictive value.

By the present invention the necessity for any adjustment or manipulation is avoided and no complex devices are required for insuring that suction is limited to the area of the web contact. When a feed roll is utilized and the web is led thereto the apertures of each successive section upon coming in contact with the web will be covered, which will block air flow therethrough and cause the restrictive valve to open and apply the full suction to that section. In leaving the roll, the web, as it is peeled from the roll, will first uncover one of the apertures which will cause the restrictive valve to close and reduce or destroy the suction in all the remaining apertures of that section, thus permitting the web to be readily peeled from the roll and not tend to follow around the roll. As each section is uncovered the restrictive valves act to reduce the duty imposed on the pumps, leaving the system at all times ready to maintain the full suction on the portion of the web in contact with the feed roll.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the present preferred and illustrative embodiment of the present invention as shown in the accompanying drawings, there is shown a feed roll suitable for feeding paper to be coated or for feeding photographic film or other web material while coating the same. As embodied, there is provided a hollow, rigid, cylindrical feed roll, indicated generally at 10, longer than the widest web to be fed and of sufficient [illegible] to maintain its shape while feeding the web

groups over the usable surface of the roll 10 in any desired manner, to form the suction members by which the web to be fed is firmly gripped and caused to adhere to the surface of the feed roll 10.

As shown the apertures are arranged in a plurality of circumferentially spaced longitudinally extending pairs of rows, and by means to be described are divided into groups of four apertures comprising two adjacent apertures of one of these pairs of rows. Secured in air tight relation to the inner surface of the shell 11 by screws 13 are a plurality of longitudinally extending strips 14 of rigid material, each strip underlying and extending beyond one pair of rows of apertures. Each strip 14 is recessed at intervals throughout its length to form with the shell 11 a plurality of chambers 16, separated by partitions 17, with each chamber underlying and communicating with the four apertures of one group of apertures. A passageway 18 through the strip 14 leads from chamber 16 to the interior of the hollow roll 10, thus connecting each group of apertures 12 with the interior of the hollow roll.

In a manner to be described later, suction is applied to the interior of roll 10 and air is drawn through passageway 18 to evacuate chamber 16 and apply suction to apertures 12 to hold the web being fed firmly against the exterior of roll 10. In order to limit the flow of air drawn through passageway 18 whenever one or more of the apertures 12 communicating with it is not covered by the web being fed and thereby reduce the required capacity of the suction pump and increase the suction which is usefully applied to the group of apertures 12 which are covered by the web, a restrictive valve is provided to restrict the passageway 18. This valve comprises a reed 20 secured by a screw 21 to the side of chamber 16 containing passageway 18. The reed 20 which may be of any suitable resilient material, such as a metallic leaf spring, is spaced from the surface of strip 14 by a washer 23 and is normally biased to non-restricting position so as to be slightly spaced from the strip 14 over the passageway 18. The reed 20 is, however, readily moved to closed or restrictive position over the passageway 18 by an abnormally large flow of air through the passageway 18, such as might be caused by one of the small apertures 12 not being covered by the web being fed. Thus when an abnormally large flow of air through the passageway 18 occurs, the reed 20 is drawn toward the bottom of the recess and into firm contact with the edges of the passageway 18. The reed 20 is provided with a relatively fine aperture or bleed 22 at its free end and positioned to register with the passageway 18 when the reed 20 is drawn into contact with the edges of the passageway. In effect closing of the restrictive valve substitutes the aperture or bleed 22 for the passageway 18 and thus greatly restricts the flow of air.

In Figure 3 the several valves are shown in their normal positions which they occupy when no suction is applied to the interior of the roll 10 or when all of the corresponding apertures 12 in the roll shell are covered by the web being fed. Figure 4, on the other hand, shows only the right hand valve in its normal position and shows the left hand valve in the closed position. The several apertures 12 communicating with the left hand valve are not covered by the web being fed and with suction applied to the interior of the roll 10 the reed 20 has been drawn down onto the bottom of the chamber 16 covering the passageway 18 and closing it except for the fine aperture or bleed 22 registering therewith.

In some cases it may be found that the restrictive aperture 22 is not [illegible] more reliable operation of the restrictive valves is assured by the provision of some such means. As the roll rotates and the web being fed leaves the roll, apertures 12 are uncovered and suction



inside roll 10 causes air to flow through apertures 12, chambers 16, and passageway 18 in a quantity to close restrictive valve 20 and thus materially reduce the air flow. As long as apertures 12 remain uncovered the differential pressure acting on valve 18 will hold it in closed position. As the apertures 12, controlled by a closed valve, again come under the web being fed, due to the rotation of the roll, the apertures 12 are again closed and the excessive air flow stops. The suction on the interior of roll 10, however, continues to evacuate chamber 16 through the bleed aperture 22 and thus creates a suction in chamber 16, reducing the pressure on the exposed side of reed 20 to such an extent that the resilience in the reed 20, assisted by centrifugal force acting on the reed when and if the roll is rapidly rotating, will overcome any differential pressure tending to hold the valve closed and the valve will open establishing unrestricted communication between the interior of the roll, the chamber 16 and the apertures 12, applying the full suction to the apertures 12 and the web covering them to hold the web firmly against the surface of the roll so as to cause the web to move with the roll.

It will be appreciated that bleed aperture need not be in the reed 20 but may be unobstructed passageways in the member 14 from the interior of the roll 10 into the chamber 16 or they may be grooves cut in the seating surface of the reed 20 either in the reed or in the member 14 so that when the valve is closed the chamber 16 will still be connected by a small passageway with the suction in the interior of roll 10.

The shell 11 of the roll 10 is closed at its ends and supported for rotation. As shown, end closure members 24 and 26 are inserted into the ends of shell 11 and secured therein in airtight relation by screws. Each end closure is provided with a concentric axial extension forming oppositely extending shafts which are journaled in spaced supports 28. Closure member 24 is provided with a concentric passageway 30 extending axially throughout its length and opening at one end into the interior of the roll 10. The opposite end of passageway 30 is plugged in an air tight manner by plug 31. A transfer bearing 32 is rotatably mounted in airtight relation on the outer end of closure member 24 and is held against rotation with closure member 24 and in position thereon between support 28 and plug 31 by clamp 33 secured to support 28. Radial passages 34 in closure member 24 connect the hollow interior of transfer bearing 32 with passage 30. A pipe 36 connects the hollow interior of transfer bearing 32 with a suitable source of suction such as a vacuum pump (not shown). The source of suction is thus connected in airtight relation, through the transfer bearing and passage 30 with the interior of the roll 10, which in turn acts as a manifold connecting all the passageways 18 in the members 14 arranged around the interior of the shell 11 of the roll 10. The roll may be rotated in any desired manner as for example by power supplied to the pulley 38 secured to closure member 26 and driven by a belt (not shown) in a well known manner, and through the transfer bearing 30 suction is continuously applied to the interior of the roll while it is rotating. As described above, the full suction is selectively applied to apertures 12 under the web 40 to clamp the web 40 firmly against the exterior of the roll 10 and feed it long as the roll is rotated.

While the relative sizes of the apertures 12, bleed hole 22 and passageway 18 may be widely varied it is of course desirable to maintain the areas of apertures 12 as small as practicable commensurate with satisfactory operation of the feed roll thereby keeping the suction loss through this aperture at a minimum.

While the reed 20 [illegible] it is preferably made straight and flat and when used in feed rolls about 6" in diameter may be 2½" long and ½" wide and, depending on the material of which it is

the suction available when spaced in its normal position, about 3/16" from passageway 16 when passageway 13 is a 1/4" hole.

While the number and arrangement of the apertures 12 may vary widely, I have found that with a 6" feed roll 8 groups of apertures around the circumference of the roll is satisfactory while the number lengthwise will depend substantially entirely on the length of the feed roll which will be slightly longer than the widest web to be fed.

Although the invention has been herein shown and described in connection with a preferred embodiment wherein a hollow chamber or cylinder is employed with the interior of this cylinder forming a common passage which is in communication with the evacuating means, it is to be understood that this is merely illustrative and not restrictive and that other organizations may equally well be employed as for example a multiplicity of channels or pipes may be employed in lieu of this common passage for establishing communication between passage 13 and the evacuating means. In the latter instance individual passages or pipes may be employed for each of the chambers 16 or more than one chamber may be associated with a single passage or pipe.

The invention in its broader aspects is not limited to the specific mechanism shown and described but departures may be made therefrom, within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. A web feeding roll for gripping a web by suction and moving along with the web, comprising a hollow roll adapted to have a web passed thereover, means for applying suction to the hollow interior of the roll, means dividing the interior surface of the roll into a plurality of chambers, individual passageways connecting the chambers with the interior of the roll, a plurality of apertures connecting each chamber with the exterior of the roll whereby suction may be applied through the passageways, chambers and apertures to the web to hold it on the exterior of the roll, a valve having a bleed aperture in each passageway spring pressed to open position, and automatically movable to flow restricting position by suction induced airflow to restrict said passageway, said valves being actuated by variation in airflow due to closing and opening of said apertures by the web passing thereover.



2. A web feeding roll as claimed in claim 1 in which the valve comprises a resilient reed mounted in a chamber and normally spaced from but overlying the passageway and movable to cover said passageway and having a bleed aperture through said reed in registering relation to said passageway.

3. A web feeding roll for gripping a web by suction and moving along with the web, comprising a hollow cylindrical roll adapted to have a web passed thereover and having a plurality of apertures therein, a cylindrical plate forming a closure for one end of the roll and removably secured thereto, another cylindrical plate removably secured to the roll forming a closure for the opposite end thereof and provided with means for applying a suction to the interior of the roll, a plurality of rigid strips removably secured to the roll and spaced about the inner periphery thereof, said strips having chambers communicating with the apertures in the roll and passageways communicating the chambers with the interior of the roll, resilient reeds mounted in the chambers normally spaced from but overlying the passageways and movable to cover said passageways, and bleed apertures in the reeds in registering relation to said passageways.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